REMARKS/ARGUMENTS

Upon careful and complete consideration of the Office Action dated September 26, 2006, applicants have amended the specification and claims which, when considered in conjunction with the comments herein below, are deemed to place the present application into condition for allowance. Favorable reconsideration of this application, as amended, is respectfully solicited.

The Examiner has requested applicants to provide the title, citation and copy of each publication that was a source used for the description of the prior art disclosure, together with a concise explanation of that publication's contribution to the description of the prior art. In order to meet this request, applicants are submitting concurrently herewith a supplemental information disclosure statement identifying those references discussed in the subject specification.

The Office Action next objected to claims 6-10 and 39-54 for being in improper multiple dependent form. Said claims have been amended to delete all multiple dependencies. In addition, claims 14-17, 32 and 34 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. More specifically, these claims were rejected based on the use of the term "preferably". These claims have been amended as well to delete said term. In deleting this term, several new claims have been added to cover the preferred ranges originally cited in the rejected claims. Accordingly, no new matter has been added by the addition of the new claims. It is further noted that claims 39-51, originally filed as "use" claims, have been amended to

be directed to "a nutritionally or pharmaceutically acceptable ingestible product" in order to comply with U.S. practice.

Based on the amended claims, it is respectfully requested that the objection under 37 C.F.R. §1.75(c) of claims 6-10 and 39-54 and the rejection under 35 U.S.C. §112, second paragraph of claims 14-17, 32 and 34 be withdrawn.

The Office Action next rejected claims 1-5 and 11-38 under 35 U.S.C. §102 (b) as being anticipated by or, in the alternative, under 35 U.S.C. §103(a) as allegedly being obvious over U.S. Patent No. 5,466,294 to Kearney et al. (hereinafter referred to as "Kearney et al.") or International Publication No. WO 96/10650 to Hyoky et al. (hereinafter referred to as "Hyoky et al.").

The Office Action stated that Kearney et al teach a process for separating sugar beet juice into different components using chromatographic techniques as claimed by the present invention. The Office Action further stated that Hyoky et al. teach a method for the fractionation of sucrose-containing solutions such as sugar beet using chromatographic techniques as claimed in the present application. The Office Action acknowledged that the claims appear to differ as to the recitation of flavor improver but concluded that since the prior art teaches the production of the same components using the same techniques, the flavor improvement would be no more than inherent to that of the prior art as the same components and process steps are used.

The Office Action also rejected claims 1-5 and 11-38 under 35 U.S.C. §102 (e) as being anticipated by or, in the alternative, under 35 U.S.C. §103 (a) as being obvious over U.S. Patent No. 6,379,735 to Yukio et al. (hereinafter referred to as "Yukio et al."). The Office Action stated that Yukio et al. teach the fractionation of molasses (from sugar

beet) using chromatography to obtain flavor components as is claimed. The Office Action then concluded that flavor improvement would be no more than inherent to that of the prior art as the same components and process steps are used.

Before addressing the rejections and the cited art, it is believed to be worthwhile to review the subject invention as presently claimed. The present invention is directed to an edible flavor improver comprising an essentially non-volatile mixture containing non-sucrose components of sugar beet extract and less than 1% betaine calculated on the dry substance, said non-sucrose components in combination being effective as a flavor improver at a level of 1 to 2000 ppm and enhancing the organoleptic characteristic(s) of ingestible products, said mixture being obtainable by fractionation of said sugar beet extract.

It is particularly pointed out that claim 1 has been amended to recite a definition of the amount of betaine included being less than 1% and by a distinct functional attribute (i.e. as a flavor improver effective at as low levels as 1 to 2000 ppm) which is not disclosed in the prior art nor apparent to the person skilled in the art.

Applicants wish to point out that the present invention is based on the surprising observation that it is possible to obtain a useful flavor improver from a product which in the prior art has been considered as foul waste, at the most fit for mixing into animal feed in small enough amounts not to spoil the taste of the feed. The product of the invention not only improves the flavor of human food, its flavor improving capacity is so high that it improves the flavor even when added to ingestible products at the surprisingly low level of 1 to 2000 ppm. As a comparison, it should be noted that at 2000 ppm, sucrose itself can hardly be tasted at all.

It is also novel and surprising that a flavor improver can be based on the non-volatile components of sugar beet extract. It is well known that taste, aroma and flavor are intermingled and that most of what we call taste is in actual fact not discerned with the tongue but rather with the nose. It is therefore the volatile components, which typically provide good taste and flavor. This well-known fact is utilized in Yukio et al., which collects the volatile components of molasses (food grade) by distilling the same with added water and ethanol in a distilling apparatus called a Spinning Cone Column.

According to the definitions in the specification of the present application (see p. 10, lines 28 to 31), the *essentially non-volatile* character means that the components in question are not easily evaporated and that they remain in solution even after evaporative operations at temperatures below 100 °C and especially at about 60 to 70 °C. The temperature in the mouth is about 37 °C and would not be expected to volatilize such components. The tongue is said to feel only four types of taste: sour, bitter, sweet and salty. It is not obvious that with this limitation of the tongue, a mixture based on components, which are not volatile, and which cannot be expected to reach the nose regions sensitive to aroma and flavor can provide a flavor improver.

It is to be noted that betaine is a non-volatile component of sugar extract and that betaine is known to have a bitter taste. Betaine thus obviously has a taste (bitter taste) that can be felt with the tongue. However, the product of the invention has been limited to containing less than 1 % betaine on the dry substance. In the preferred embodiment, the level of betaine is even lower. It is clear that this low level of betaine is not responsible for providing the flavor improving quality of the invention.

The Applicants, noting that betaine is a component of most of the residual products produced according to the prior art processes, has studied the impact of betaine on the flavor improving character of the present product. Tasting of residual fractions has confirmed that the betaine level should be below 1 % in order to favorably improve the flavor of ingestible products.

Again, with the intention of better defining the present invention, claim 1 has been limited by defining that the flavor improver comprises less than 1% betaine. Support for this amendment can be found on page 19 of the subject specification, lines 25-28. Claim 1 has further been limited by giving the flavor improving and enhancing characteristic a definition indicating the strength and effectivity of the claimed flavor improving character of the components in combination. The new definition also makes clear that even if sucrose were to be included in the actual product, it is the non-sucrose components, which provide the effective flavor improvement. The limitation is based on claim 43 and the disclosure found in the subject specification at page 14, lines 22 to 31.

Process claim 28 has also been limited to indicate the amount of betaine as being less than 1%, as has product claim 39 (as it contains all the new limitations of claim1 by reference).

In discussing the rejection of the claims made by the Office Action, it is respectfully submitted that it is axiomatic that anticipation under Section 102 requires that the prior art reference disclose every element of the claim. In re King, 801 F.2d 1324, 1326, 231 U.S.P.Q. 136, 138 (Fed. Cir. 1986). Thus, there may be no differences between the subject matter of the claim and the disclosure of the prior art reference. Stated in another way, the reference must contain within its four corners adequate

directions to practice the invention. The corollary of this rule is equally applicable. The absence from the reference of any claimed element negates anticipation. Kolster Speedsteel AB v. Crucible Inc., 793 F.2d 1565, 1571, 230 U.S.P.Q. 81, 84 (Fed. Cir. 1986).

In making a rejection under 35 U.S.C. §103, the Office Action must take into account the total teachings of the reference. As stated by the CAFC, each prior art reference must be evaluated as an entirety, and all of the prior art must be evaluated as a whole. See Panduit Corp. v. Dennison Mfg. Co., 774 F.2d 1082, 227 U.S.P.Q. 337 (Fed. Cir. 1985) and EWP Corp. v. Reliance Universal Inc., 755 F.2d 898, 225 U.S.P.Q. 20 (Fed. Cir. 1985).

Turning back to the specific rejections of the claims made by the Office Action, and particularly the rejection based on Kearney et al., it is noted that this reference is discussed in the subject specification on pages 8-9 thereof. Kearney et al. disclose a process for purifying raw juice obtained from sugar beets, comprising subjecting the raw juice to a softening procedure to remove calcium, concentrating said soft raw juice to produce a soft raw syrup, subjecting said soft raw syrup to a chromatographic separation procedure to obtain a purified raw syrup extract containing less than about a half of the non-sucrose dissolved solid constituents contained by said raw juice. The chromatographic separation is typically carried out using a low cross-linked gel type chromatographic separation resin in a monovalent metal form. The raw syrup extract obtained is then subjected to sugar recovery by crystallization.

The Office Action has specifically referred to column 7, lines 59-66, of Kearney et al. where it is stated that:

> The soft raw syrup is eventually fed to a strong cation based chromatographic separator 22. The by-product (raw syrup raffinate) obtained from the separator 22 contains the majority of the non-sucrose. These nonsucrose constituents comprise the salts, amino acids, raffinose, colored materials, etc. which were originally present in the sugar beets.

It is respectfully submitted that Kearney et al. is based on chromatographic techniques and that it does not disclose a process for producing a flavor improver. The by-product of Kearney et al. (the raw syrup raffinate) is said to be suitable for use as an animal feed or as a chemical feedstock. The raffinate obtained in Example 1 of Kearney et al. contains 2.8 % betaine (see Table at the end of Example 1), which takes it outside the scope of amended claim 1. For these reasons, clearly King and Kolster Speedsteel show that Kearney et al. falls short of the anticipation standard of 35 U.S.C. §102(b). It is therefore respectfully requested that the rejection of the claims under 35 U.S.C. §102 be withdrawn. The above-noted differences also make it clear that the present invention as now claimed could not have been derived from the teachings of Kearney et al. Consequently, it is respectfully requested that the rejection of the claims under 35 U.S.C. §103(a) be withdrawn as well.

Hyoky et al. is also described in the subject specification (see page 9, lines 4-6). Hyoky et al. refer to a method for separating sucrose and betaine from a beet-derived sucrose-containing solution, wherein the solution is subjected to a first fractionation by a chromatographic simulated moving bed method to yield a sucrose-enriched fraction and a fraction enriched with betaine or a fraction enriched with sucrose and betaine. The resulting fraction is subjected to a second chromatographic fractionation to yield a second sucrose-enriched fraction and a separate fraction enriched with betaine. Thus, the method

of Hyoky et al. is based on chromatographic techniques and it yields a sucrose fraction and a betaine fraction with high yield of sucrose and betaine, respectively.

It is noted that Hyoky et al. also provide a third fraction, the residual fraction, which may contain less than 1 % betaine and which contains a large proportion of non-sucrose components (see e.g. Table 6 on page 26 of Hyoky et al.). However, Hyoky et al. do not perform the process *for providing* a flavor improver as in the process claims of the present invention nor do Hyoky et al. suggest the use of the residual fraction as a flavor improver. Thus, the process and product claims are novel and unobvious over the teachings of Hyoky et al.

Moreover, amended claim 1 requires that the product should be an effective flavor improver at levels of 1 to 2000 ppm. Hyoky et al. do not suggest nor make it immediately apparent to a skilled person that the residual fraction has a flavor improving character at levels of 1 to 2000 ppm. As a matter of fact, Hyoky et al. do not suggest any specific properties for the residual by-product fraction at all.

In the present invention, a fractionation system is used which provides an effective flavor improving mixture from a raw material that was previously considered fit only for animal feed. In the present invention the essentially non-volatile mixture containing non-sucrose components of sugar beet extract is effective in improving the flavor and enhancing the organoleptic characteristics of ingestible products. As disclosed on page 14 of the subject description, the flavor improver according to the present invention contains a multitude of components deriving from the beet sugar process and which are other than saccharose, monosaccharides and betaine. Some of the components found which provide the over all flavor effect of the flavor improver are present in

extremely low amounts. As is explained on page 19 of the subject specification, in the description the flavor improver typically contains organic acids a total of 45 to 5 % calculated on the dry substance. The mixture preferably contains very little saccharose and/or raffinose. The mixture is also substantially free of monosaccharides. Betaine is a component which has a bitter taste and the fraction according to the present invention contains less than 1 % betaine.

It should be noted that Hyoky et al. aim at producing fractions high in sucrose and high in betaine, respectively, and that Hyoky et al. do not aim at recovering a flavor improving product with a low betaine content (less than 1 %) and sucrose content less than 60 % (most preferably less than 10 %) like in the present invention. Therefore, the claims as amended are inventive over the teaching of Hyoky et al. and the rejection of the claims based on Hyoky et al. are respectfully requested to be withdrawn.

Yukio et al. is also mentioned in the subject specification (page 5, lines 9-18). Yukio et al. relate to a method for preparing a sugar-like flavorous component based on the components of molasses, which are used as the usual foods (see column 3, line 3). This indicates that the molasses of Yukio et al. are of cane origin and not of beet origin, as in the present invention, since only cane molasses are used as foods.

In the method described in Yukio et al., the components of molasses are recovered using a specific distillation equipment called a Spinning Cone Column (SCC). In the distillation according to Yukio et al., ion exchange water, ethanol and molasses are added into a feed tank, these components are mixed and dissolved thoroughly with stirring and the resulting solution is introduced into the SCC. The temperature in the

column during the distillation is kept between 40 to 60 °C. Thus, the flavorous product recovered in Yukio et al. consists of the volatile components of molasses.

The product of the present invention specifically comprises essentially non-volatile components, by which is meant components, which remain in solution even though they are subjected to evaporative (distilling) operations at a temperature as high as 60 to 70 °C (see the specification, page 10, lines 28 to 31).

One fractionation process that can be used to provide the desired product of the invention comprises evaporation (see present claim 3). Although the distillation of Yukio et al. is also a fractionation process, it is not one, which provides a product of essentially non-volatile character. In fact, the evaporation of the present invention is the counterpart of distillation. In an evaporation, as in the present invention, the volatile components are removed. In a distillation, as in Yukio et al., the volatile components are recovered.

It is thus clear that the components recovered by spinning cone distillation at 40 to 60 °C in Yukio et al. are volatile chemical compounds totally different from the non-volatile chemical compounds, which remain in solution despite evaporation at 60 to 70 °C and which make up the mixture of the present invention.

While it comes as no surprise to a person skilled in the art that the volatile components of molasses can provide a sugar-like flavor as in Yukio et al., it is by no means obvious that the non-volatile components can provide a flavor improver. The residue after the removal of the volatiles is typically a musty dark fluid that most people would not even like to taste.

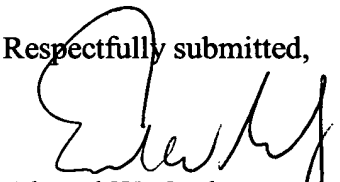
The present invention relates to the recovery of totally different components of molasses than in Yukio et al. since in the present method non-volatile components are

recovered which cannot be recovered by the distillation of Yukio et al. Consequently, since Yukio et al. relates to volatile components of molasses and the present invention relates to non-volatile components of molasses, Yukio et al. cannot be considered relevant in view of the patentability of the present invention.

Furthermore, there is no indication in Yukio et al. that a non-volatile fraction of sugar beet extract with less than 1 % betaine comprises a flavor improver at levels of 1 to 2000 ppm. Consequently, the claims as amended, are both novel and inventive over Yukio et al. Accordingly, the rejections of the claims based on Yukio et al. are also requested to be withdrawn.

Finally, it is further submitted that all the claims in the application as presently submitted contain patentable subject matter and a Notice of Allowance is earnestly solicited.

Respectfully submitted,



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